

First Annual University Reciprocating Engine Program Review **April 9 and 10, 2003, Morgantown, West Virginia**

NETL hosted the First Annual Advanced University Reciprocating Engine Program (AUREP) Review on April 9 and 10, 2003, for stakeholders in the Advanced Reciprocating Engines Research (ARES) Program.

On April 9 and 10, 2003 DOE/NETL hosted the “First Annual University Reciprocating Engine Program Review.” This event was attended by Universities (*Colorado State, MIT, Michigan Technological University, Purdue, University of Southern California, University of Texas, West Virginia University, Ohio State, University of Tennessee, Penn State and University of Maryland*), national labs (*ORNL, ANL and NETL*), stationary power reciprocating engine manufacturers (*Caterpillar, Cummins, and Waukesha*), government representatives (*California Energy Commission and DOE*) and others with a vested interest in the Advanced Reciprocating Engines Systems Program (ARES).

University Stakeholders



Industry Stakeholders



Government Stakeholders



The university research portion of the ARES program is managed by the DOE Office of Energy Efficiency and Renewable Energy with support from the DOE Office of Fossil Energy, National Energy Technology Laboratory (NETL). The university research component of the ARES program was initiated only recently; the first contracts were awarded in September 2002.

This first meeting had three major components:

1. Presentations of university contracted research,
2. Separate and combined stakeholder meetings (university, government, and industry), and
3. Tours: NETL Diesel Lab and WVU Engine Facility.

Research Presentations

Overall, the university presentations were excellent and presenters honored time constraints. That allowed a robust question and answer segment following each talk. Participants commented on the openness and constructive feedback during the question and answer sessions as well as during stakeholder working meetings. Click on the following titles to link to the specific presentation:

- *Fundamental Studies of Ignition Processes in Large Natural Gas Engines Using Laser Spark Ignition*, Bryan Willson, Colorado State University
- *Low Engine Friction Technology for Advanced Natural Gas Reciprocating Engines*, Victor Wong, Massachusetts Institute of Technology
- *Ignition Improvement of Lean Natural Gas Mixtures*, Lee Oberto and Kirk Opella, Michigan Technological University
- *Advanced Natural Gas Reciprocating Engine: Parasitic Loss Control Through Surface Modification*, Farshid Sadeghi, Purdue University
- *Corona Discharge Ignition for Advanced Stationary Natural Gas Engines*, Paul D. Ronney, University of Southern California
- *Reduced Engine Friction and Wear*, Ron Matthews, University of Texas
- *Rail-Plug Ignition System for Enhancing Engine Performance and Reducing Maintenance*, Ron Matthews, University of Texas at Austin
- *Selective NO_x Re-Circulation for Stationary Lean-Burn Natural Gas Engine*, Nigel Clark, West Virginia University
- *Energy Thermal Management via Active Flow Control*, David Irick, University of Tennessee
- *Two Stage Catalytic Reduction of NO_x*, Umit S. Ozkan, Ohio State University
- *Improvement to Pipeline Compressor Engine Reliability Through Retro-Fit Micro-Pilot Ignition System*, Bryan Willson, Colorado State University [NOTE: This project is actually funded by the Office of Fossil Energy's Oil & Gas Program.]

Stakeholder Reports

On the morning of the second day, the three stakeholder groups met separately for 1.5 hours and then reconvened together to summarize their discussions.

Government stakeholders stressed the importance of (1) identifying program linkages and cultivating them, and (2) special interest groups and the reciprocating engine industries' promotion of the program.

University stakeholders proposed the formation of an Academic Advisory Board and formed committees to develop a charter, establish uniform engine test criteria for university researchers, improve and accelerate technology transfer (especially between similar programs), and develop a "systems" understanding that comprehensively links the various different aspects of the program.

Industry stakeholders gave the program a high rating and announced they would promote the university program. Industry stakeholders requested that they be allowed to continue to provide input into the selection of research topics and projects. Industry stakeholders announced that they are highly supportive of the formation of an Academic Advisory Board.

Tours

Participants touring the NETL reciprocating engine laboratory saw a laser-fired diesel engine that ran on extremely leaner fuel, much leaner than possible with traditional spark ignition. This was the first known public demonstration of laser-fired diesel operation. Reliability was demonstrated with a continuous run of 10 hours.

The participants also toured the WVU National Research Center for Alternative Fuels, Engines, and Emissions. The Center has expertise in all aspects of exhaust emissions reduction, engine performance improvement, fuel enhancements, and alternative fuels. During the tour, a certification cell for transient engine emissions was demonstrated. The cell was equipped with a full-scale dilution tunnel and was sized for over-the-road truck engines. Sampling systems for both regulated and non-regulated species demonstrated. In addition, the visiting group saw a novel, portable sampling system for emissions characterization and test facilities for diesel and natural gas engine research. www.mae.wvu.edu